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On the Distribution Confirmation and Immature Stage of *Targalla delatrix* (Guenée, 1852) in Mainland Taiwan and Kinmen (Lepidoptera: Euteliidae)

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Abstract. The occurrence of the euteliid moth *Targalla delatrix* (Guenée, 1852) in mainland Taiwan and Kinmen is confirmed through genitalia examination with reporting its newly recorded hostplants as *Syzygium acuminatissimum* (Blume) DC. and agriculturally important *Mangifera indica* L. (mango), respectively. The latter represents the first hostplant of *Targalla* recording on the plant family Anacardiaceae. Further identification for the purpose of mango quarantine should be more careful since the larvae of *T. delatrix* and *Penicillaria jocosatrix* Guenée, 1852, that both feeding on mango, are very similar in external appearance. In addition, the Chinese vernacular name of the comparable species, *T. silvicosta* Watabiki and Yoshimatsu 2014, is newly proposed.

Keywords: Oriental region, southern China, pest management

Introduction

The *Targalla delatrix* (Guenée, 1852) species group is one of most difficult moth group for identifying directly through external adult and larval morphology, as well as some members represent pest on agriculturally important fruit taxa such as *Eugenia* and *Sandoricum* (Myrtaceae) (Kuroko & Lewvanich, 1993; Robinson et al., 2001), thus the correct identification and the corresponding hostplant range are needed for integrated pest management and ecological research. After Holloway (1985), Poole (1989), Kishida (2011), recently Watabiki & Yoshimatsu (2014) elucidated the taxonomic problem of *T. delatrix* species group in Japan and East, Southeast Asia through genitalia and molecular barcoding. The present study follows the previous progress to confirm the identity of two populations of *T. delatrix* species group with reporting their hostplants in Taiwan and Kinmen.

Abbreviation
NTM National Taiwan Museum, Taipei
TFRI Insect collection, Taiwan Forestry Research Institute, Taipei

***Targalla delatrix* (Guenée, 1852)**
綠斑浮尾蛾
(Figs 1–3, 5, 6, 8, 10, 11)

Penicillaria delatrix Guenée, 1852; *Hist. nat. Ins., Spec. gén. Lépid. 6 (Noct. 2)*: 304.
Eutelia plusioides Walker, 1865, *List Spec. Lepid. Insects Colln Br. Mus.* 33: 822.
Eurhipia praetexta Felder & Rogenhofer, 1874, *Reise Fregatte Novara, Bd 2 (Abth. 2)* (4): pl. 111, f. 24.
Eutelia delatrix: Hampson, 1894: 391.
Phlegetonia delatrix: Hampson, 1912: 84.
Targalla delatrix: Swinhoe, 1888: 337; Swinhoe, 1890: 85; Holloway, 1985: 190.

Specimens examined. TAIWAN. 2 males & 1 female, Taichung City, Xinshe, 2. VIII. 2020, leg. C.-L. Lo, hostplant - *Syzygium acuminatissimum* (Blume) DC., TMIN4348(male), TMIN4349(female) with slides, TMIN4350(male) (NTM) (Figs 1, 2, 5, 8, 10); 1 male, Kinmen County, Jinhu Township, Yang Ming Cai Guan, leg. C.-F. Lee, hostplant - *Mangifera indica* L. TMIN3884 (NTM) (Figs 3, 6, 11).

Taxonomic notes. Concerning the identification of *Targalla delatrix* species group and its potential member in Taiwan, Holloway (1985) first listed *T. palliatrix* and *T. subocellata* from Taiwan with the statement as “Taiwan” and “?Taiwan”, respectively. Further Wang (1994) also listed these two in the Taiwanese fauna with one male specimen illustrated for *T. palliatrix*. Sugi (1992) only listed one *Targalla* species, *T. delatrix*, in the Taiwanese fauna. Watabiki & Yoshimatsu (2014) did not examine any specimens of *T. delatrix*, *T. palliatrix* and *T. subocellata* from Taiwan and described an additional new species *Targalla silvicola* with 17 Taiwanese paratypes designated. Ronkay et al. (2013) recorded *T. delatrix* from Hohuanshan region, Wu et al. (2020) regarded that Hohuanshan specimen as *T. subocellata*. Fu et al. (2021) recorded three *T. delatrix* from Nanheng mountain region, however their

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actual identity should be re-checked. As Watabiki & Yoshimatsu (2014)'s statement, *T. delatrix* species group is difficult to be identified through external appearance, therefore, genitalia or molecular information are generally needed for detecting actual species richness and abundance in Taiwan. To our best knowledge, the genitalia of the Taiwanese *T. delatrix* are illustrated for the first time.

Diagnosis.

Holloway (1985) designated the lectotype of *Targalla delatrix*, Watabiki & Yoshimatsu (2014) reviewed *T. delatrix* species group. The present species identification is based on genitalia examination with referring to Watabiki & Yoshimatsu (2014). All available sexes of two populations are checked and illustrated with genitalia (Figs 5, 6, 8). Hitherto no *Targalla* or con-subfamily species in Kinmen has been recorded, e.g. Fan et al. (2000), Chang (2011; 2017), therefore the diagnosis of *T. delatrix* can be referred to the plates in the present study. In mainland Taiwan, two species belonging to *T. delatrix* species group confirmed through genitalia are *T. delatrix* (Figs 5, 6, 8) and *T. silvicola* (Figs 4, 7, 9), the latter has more oblique forewing medial line, but genitalia characters are needed to diagnosis. According to Watabiki & Yoshimatsu (2014), the valval distal part of *T. delatrix* is compact rather than bifid in *T. silvicol*a; the vesica is multilobed, bearing short conical cornuti and some sclerotized plates in *T. delatrix* rather than bearing three conspicuous same sized cornute, a plate-like cornutus and a densely spiny band in *T. silvicola*; ostium bursae symmetrical, sclerotized and tapering toward ductus bursae in *T. delatrix* rather than only symmetrical and sclerotized in *T. silvicola*. More information about *T. silvicosta* is given later.

Notes. The Chinese vernacular name for *Targalla delatrix*, as given by Ronkay et al. (2013) and Fu et al. (2021), is "綠斑浮尾蛾". However, this identification may be problematic, as well as the term "綠斑 (green spot)" does not correspond to any external color pattern observed in this species. Consequently, we just tentatively retain its usage in the present study.

***Targalla silvicosta* Watabiki & Yoshimatsu 2014**
森林浮尾蛾 (newly proposed Chinese vernacular name)、寺浮尾夜蛾
(Figs 4, 7, 9)

Phlegetonia delatrix: Kuroko, 1957: 76; Watanabe, 1980: 150; Sugi, 1982: 789 (in part).
Targalla delatrix: Kishida, 2011: 267 (in part).
Targalla subocellata: Wang & Kishida, 2011: 245; Zahiri et al., 2011: 164.

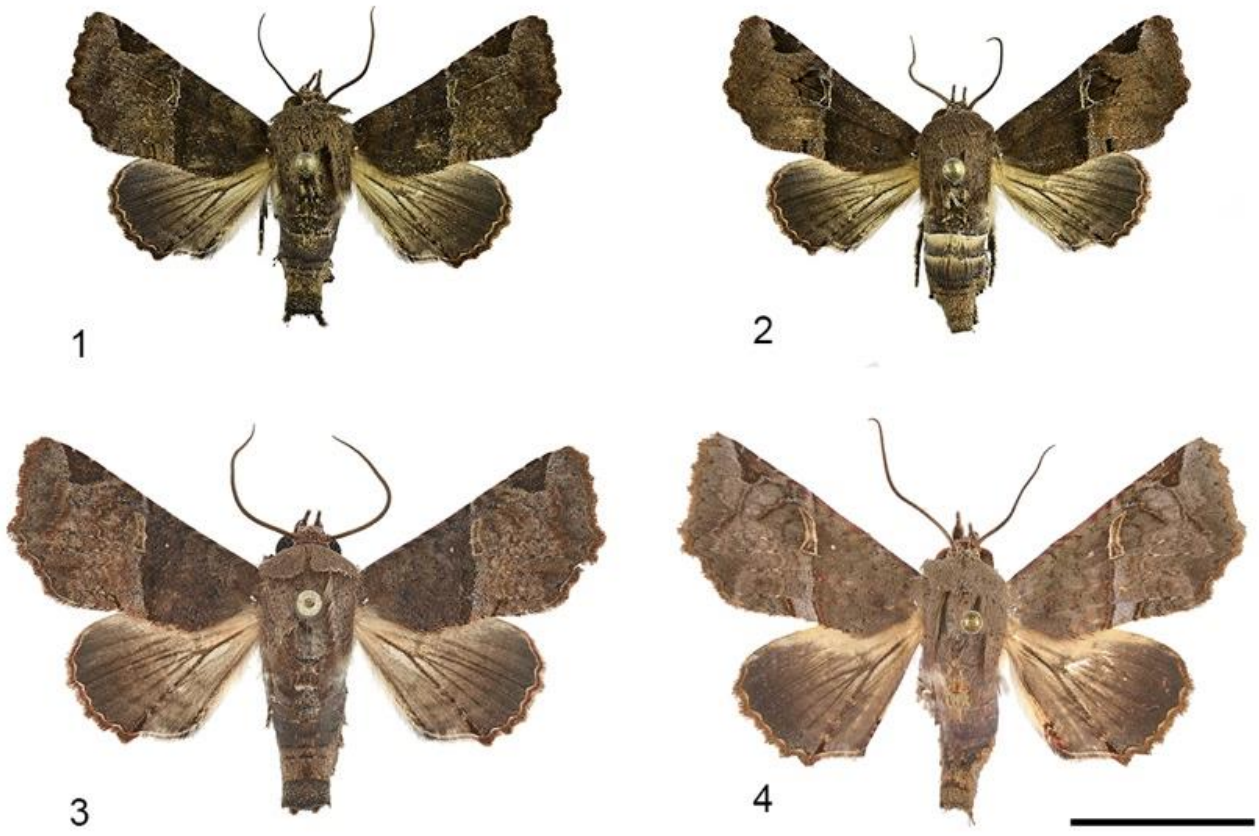
Specimens examined. TAIWAN. 1 male, Hsinchu Co., Yulao, 28. VI. 2014, C. G. Lai, TFRI175943 with slide; 1 male, Hualien Co. Luosao, 16. II. 1989, leg. Y. B. Fan, "Targalla delatrix (Guenee, 1852) det. L. Ronkay, 2000", TFRI3768 with slide (TFRI) (Fig. 7); 1 female, Hualien Co. Luosao, 6. VI. 2013, leg. S. Wu & W. C. Chang, SWC2024-0001 & TMIN4347 with slide (NTM) (Fig. 9).

Distribution. China, Taiwan, Vietnam (type locality), Laos, Japan (Eda, 2018).

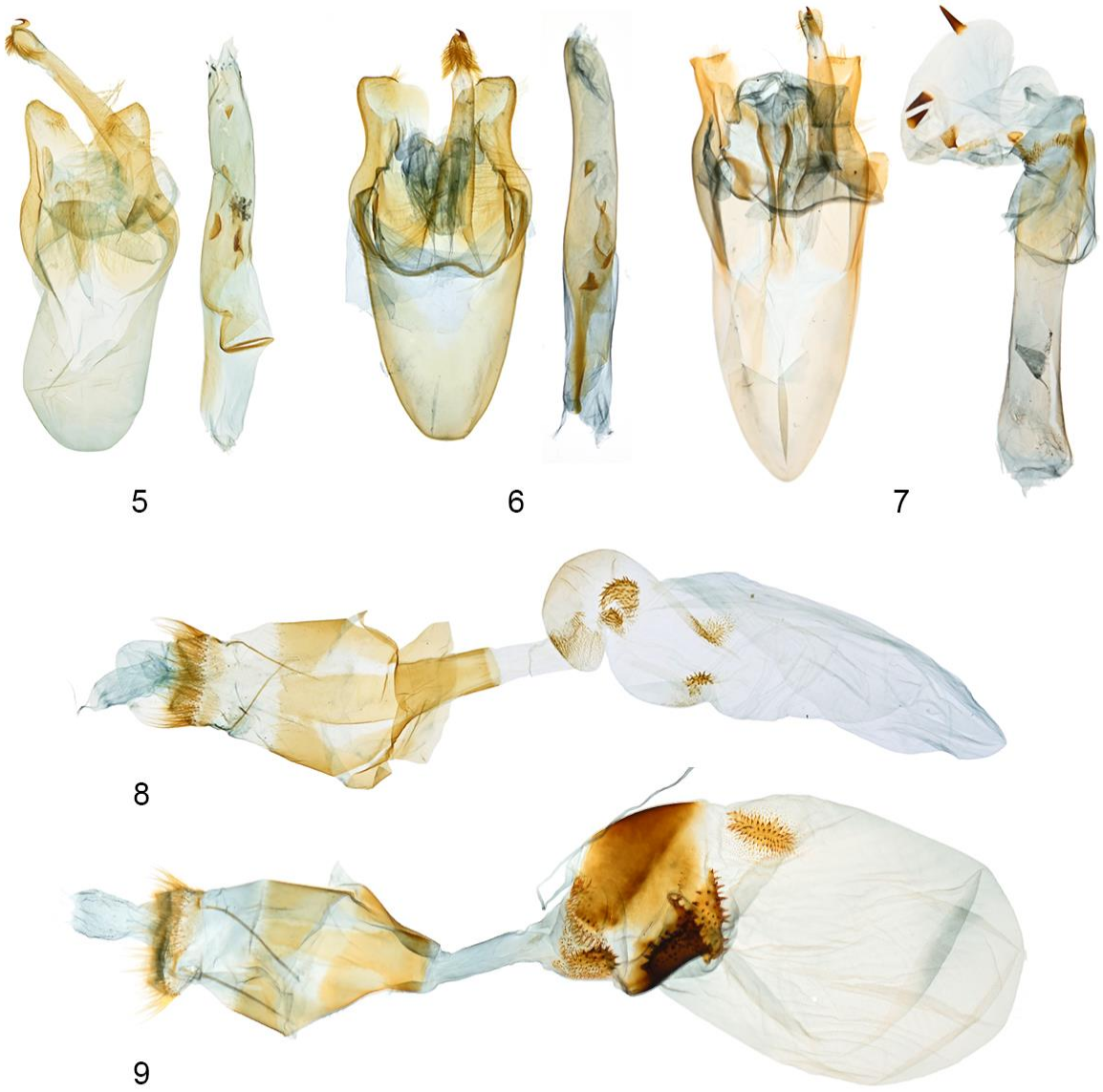
Notes. Eda (2018) gave the Chinese vernacular name for this species in China as 寺浮尾夜蛾, presumably through transliteration. The original etymology for "*silvicosta*" in Watabiki & Yoshimatsu (2014) is ""a resident of forest", we herein propose a new Chinese vernacular name, "森林浮尾蛾", for its use in Taiwan.

Discussion

According to the previous studies, e.g. (Holloway, 1985; Kuroko & Lewvanich, 1993; Robinson et al., 2001), the hostplant of *Targalla* restricts in the plant family Myrtaceae. The record in the present study for Kinmen *T. delatrix* on Mango represents the first *Targalla* on the plant family Anacardiaceae. Shih et al. (2013) listed two euteliid moths, *Chlumetia transversa* (Walker, 1863) and *Penicillaria jocosatrix* Guenée, 1852, as the pest of *Mangifera indica* (mango; Anacardiaceae). Both larvae of *T. delatrix* (Fig. 11) and *P. jocosatrix* (Fig. 12; Fig. 13 as the emerging adult) on mango are light green without obvious line or spot patterns and can not be distinguished well based on the available voucher images. The further identification of mango euteliid moths may need more careful, especially for the purpose of quarantine. In addition, the individuals of *T. delatrix* feeding on *Syzygium acuminatissimum* (Fig. 10) have the anterior and posterior segments of the body tinged with orange with distinct dorsolateral white line, implying that at least final instar larvae of *T. delatrix* may vary in color patterns according to different host use.



Figures 1–4. The habitus of *Targalla* species in Taiwan and Kinmen. 1. *T. delatrix* (Guenée, 1852), male, Taiwan, TMIN4348; 2. Ditto, female, Taiwan, TMIN4349; 3. Ditto, male, Kinmen, TMIN3884; 4. *T. silvilcola* Watabiki & Yoshimatsu, 2014, male, Taiwan, TFRI175943 (TFRI). Photo by Shipher Wu. Scale for figure = 10 mm.



Figures 5–9. The genitalia of *Targalla* species in Taiwan and Kinmen. 5. *T. delatrix* (Guenée, 1852), male, Taiwan, TMIN4348; 6. Ditto, male, Kinmen, TMIN3884; 7. *T. silvilcola* Watabiki & Yoshimatsu, 2014, male, Taiwan, TFRI175943 (TFRI); 8. *T. delatrix*, female, Taiwan, TMIN4349; 9. *T. silvilcola*, female, Taiwan, TMIN4347. Photo by Shipher Wu.

Figures 10–13. The Euteliinae in Taiwan and Kinmen. 10-12. Immature stage; 13. Adult. 10. *T. delatrix* (Guenée, 1852), Taiwan; 11. ditto, Kinmen; 12–13. *Penicillaria jocosatrix* Guenée, 1852, Taiwan. Photo by Chung-Liang Lo (10); Chi-Feng Lee (11); Zen-Ban Xie (12, 13).

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臺灣本島與金門地區”綠斑浮尾蛾”的分布確認及其幼生期（鱗翅目：尾蛾科）

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摘要: 本研究透過生殖器官檢視確認了在臺灣本島和金門地區尾科”綠斑浮尾蛾” (*Targalla delatrix* (Guenée, 1852)) 的分布，並首次記錄其新寄主植物為賽赤楠 (*Syzygium acuminatissimum* (Blume) DC.) 以及在農業上重要的芒果 (*Mangifera indica* L.)。後者為此蛾種於漆樹科 (Anacardiaceae) 上的首次寄主植物紀錄。由於同樣取食芒果的綠斑浮尾蛾和芒果重尾蛾 (*Penicillaria jocosatrix* Guenée, 1852) 的幼蟲在外觀上非常相似，因此基於檢疫的鑑定需要更加謹慎。此外，用以比較物種 – 森林浮尾蛾 (*T. silvicosta* Watabiki and Yoshimatsu 2014) 的新建議中文名稱亦被提出。

關鍵詞: 東方區、華南地區、蟲害管理

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First Record of *Erigone atra* Blackwall, 1833 in Taiwan (Araneae: Linyphiidae)

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Abstract. This is the first record of *Erigone atra* from Taiwan, with a taxonomic key of Taiwanese species.

Keywords: Nantou, taxonomic key, new record, dwarf spiders

Erigone Audouin, 1826, a genus of the dwarf spider family Linyphiidae, encompasses 111 described species (World Spider Catalog, 2023). Among these, only two are found in Taiwan (Fig. 1A): *E. prominens* Bösenberg & Strand, 1906 (Chu & Okuma, 1970) and *E. koshiensis* Oi, 1960 (Lee, 1964). By comparing specimens from Nantou with the original description (Blackwall, 1833) and images from neighboring regions (Song & Li 2008; Ono et al. 2009; Seo 2011; Irfan, Zhang & Peng 2022), we have confirmed the presence of *Erigone atra* Blackwall, 1833 in Taiwan. The species has been found exclusively at higher elevations in Taiwan, different from the species' occurrences in adjacent areas, thus highlighting the necessity for increased research and attention.

Genus *Erigone* Audouin, 1826

***Erigone atra* Blackwall, 1833 黑微蛛**

Material examined. TAIWAN: Nantou County: 1 ♂ Ren'ai Township (仁愛鄉), 24.15°N, 121.25°E, 3100m, VII-5-2020, YU-CHUN HSIAO Leg. ABARA_04747 (Alcoholic fluid specimen, Department of Life Sciences, NCHU).

The identification was based on following characteristics: a triangular dark brown carapace with radial patterns (Fig. 1B), an elevated ocular region (Fig. 1C), and chelicerae with five prominent teeth (Fig. 1D). The abdomen is gray-brown, while the legs are light brown with a tibial chaetotaxy 2-2-2-1. In males, the pedipalp features denticles on the femur and a patella with a long blunt process known as the patella apophysis (Fig. 1E). Additionally, the male palp organ exhibits an anterior radical process that is semi-circular with a central concavity, an upward-extending embolus membrane and median membrane, a median membrane ending in a protuberance, and a smooth, blunt retrolateral tibial apophysis (Fig. 1F).

Key to the Taiwanese Species of the Genus *Erigone* for Male (modified from Song & Li 2008; Ono et al. 2009; Seo 2011)

1. The femur of the pedipalp is equipped with multiple denticles, and the retrolateral patella apophysis is blunt. The palpal organ features a distal suprategular apophysis extending upward from the base, while the retrolateral tibial apophysis is smooth and blunt-shaped.…….... *E. atra*
   The femur of the pedipalp lacks prominent denticles, and the retrolateral patella apophysis is pointed. The palpal organ features a distal suprategular apophysis that bends and has multiple small bifurcations at the top, while the retrolateral tibial apophysis is acute and pointed in shape..…….....2
2. Length of pedipalp patella longer than pedipalp tibia…….…….. *E. prominens*
   Length of pedipalp patella not longer than pedipalp tibia……..…… *E. koshiensis*

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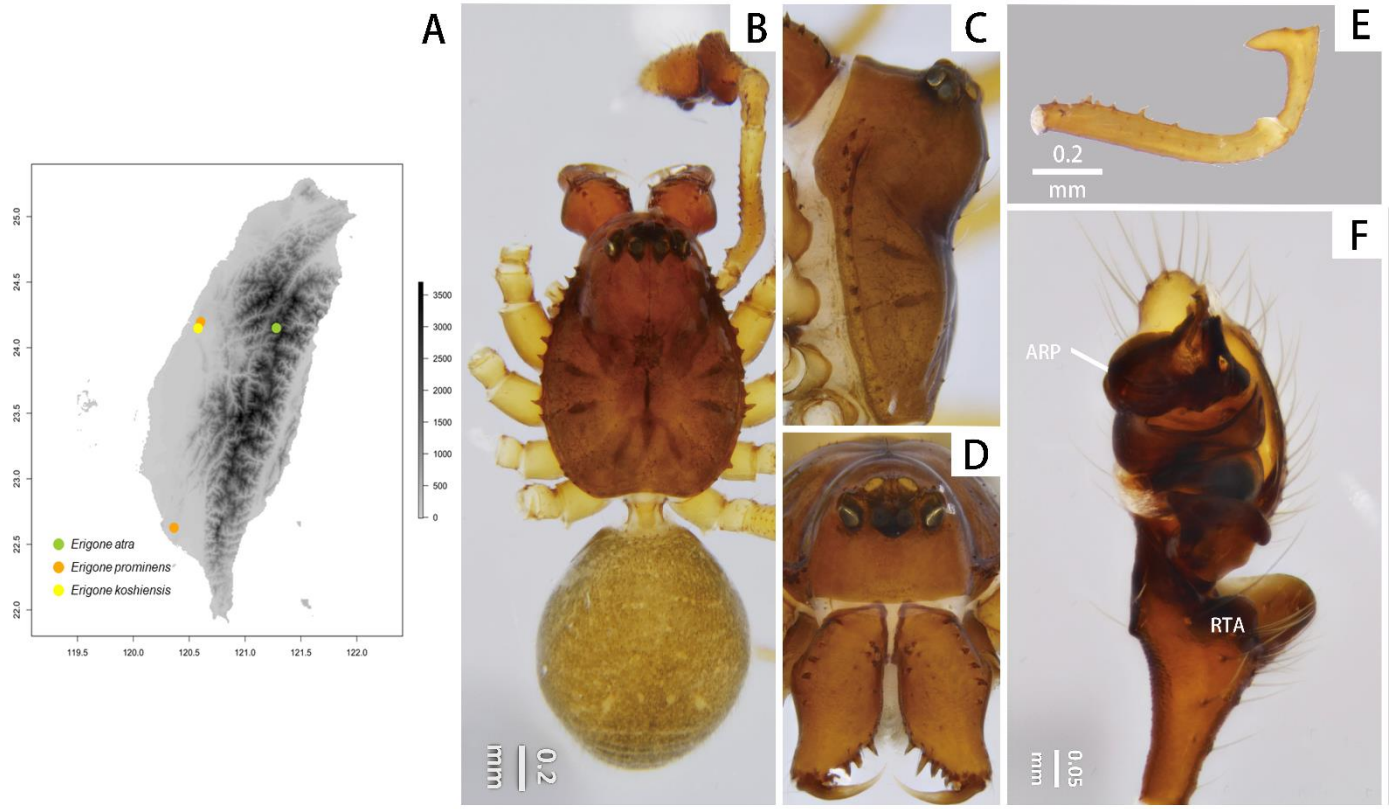

Figure 1. A, Specimen records of *Erigone* spp. in Taiwan. *Erigone atra* Blackwall, 1833, Male: B, Dorsal view. C, lateral view of the carapace. D, Anterior view of the carapace. E, Patella and femur of right male palp, retrolateral view. F, Left palp. Abbreviations: ARP, anterior radical process; RTA, retrolateral tibial apophysis. Morphological terminology is referenced according to Hormiga (2000).

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黑微蛛於臺灣之首次紀錄 (蜘蛛目：皿蛛科)

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摘要：廣布於全北界的黑微蛛首次記錄於臺灣，並附上臺灣微蛛屬的檢索表。

關鍵詞：南投、檢索表、新紀錄、微蛛亞科

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臺 灣 昆 蟲 同 好 會

Taiwanese Society of Insect Natural History

本會為臺灣昆蟲(含蛛形)愛好者所組成，廣納研究同好為會友，以定期與不定期方式舉辦各種研討聚會、發行昆蟲(含蛛形)自然史相關觀察研究期刊，凝聚全臺愛好者，以促進我國昆蟲、蛛形自然史之發展。

「臺灣研蟲誌」（Taiwanese Journal of Entomological Studies）係臺灣昆蟲同好會正式出版的刊物，每年出版一卷四期，於三月、六月、九月及十二月各出一期，歡迎踴躍投稿，但以未曾刊載於其他刊物者為限。凡有關昆蟲或蛛形綱的自然史相關如野外生態行為、區域物種相調查、飼養記錄、形態觀察描述，以英文或繁體中文撰寫，皆在歡迎之列。

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